TO THE MEMORY OF
MY FATHER,
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SO-CALLED

“SPONTANEOUS COMBUSTION,”

OR

INCREASED COMBUSTIBILITY OF THE HUMAN BODY,

WITH EXPERIMENTS.

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This subject has occupied the minds of philosophers and scientists for over 200 years.

Different theories have been advanced, but up to date its cause has remained a profound mystery. It is evident that the weight of authority on this subject is not in favor of said phenomenon.

Writers on medical jurisprudence have expressed so many different and contradictory opinions that I have made it my duty since 1880 to investigate, experiment and try to solve this mysterious combustion which for two centuries received no plausible nor satisfactory solution.

My father, Dr. John Joseph Havá, related to me that in 1862, while on one of his professional calls to a plantation named “El Orizonte,” on the island of Cuba, he noticed a singular case of spontaneous combustion (so-called). He had been consulted by, and treated, an old negro woman, a slave on said plantation, for a queer form of paralysis. This woman was very corpulent, and had been occupied for a period of more than twenty years in parching coffee for the daily use

of the plantation. A remarkable fact was that she always appeared as if under the influence of liquor, and never perspired in the warmest weather; on the contrary, she complained of feeling cold, and would always be around a furnace.

One morning she was discovered dead and burning. My father arrived in time to witness the fact. The room was filled with smoke, and the odor emanating from the partly charred body had the characteristic smell of burnt human flesh; the parts carbonized and yet in combustion were the thighs, the abdomen and the chest; the ends of the limbs were spared, and the combustible objects around the body had not been damaged. This case, I believe, was reported at the time to the Academy of Sciences of Havana, in a short report, merely stating the facts. The corpse was immediately buried (contrary to my father's request), because the negroes on the plantation became frantic and firmly believed that an evil spirit had appeared in their midst. My father having stated to me that increased combustibility of the human body was really true, but that its cause was unknown, I immediately felt an irresistible desire to investigate this strange phenomenon.

After having read and pondered over the majority of cases on record I made the following observations: That the abuse of alcoholic liquors had been suspected, and that the accumulation of alcohol was theoretically, but not practically, its cause.

This strange combustion had happened in all countries, at all seasons, but more so in winter and cold climates, but is very rare in our days. The victims were fat females, as a rule, and advanced in years, suffering more or less from chronic bronchitis.

These poor creatures were sluggish and drowsy, always complaining of feeling cold, and therefore living in small apartments, badly ventilated, in which a furnace was kept constantly burning, and using besides a heating apparatus commonly called "chaufferette" or foot-warmer, used by the poorer classes in European countries to keep their feet and bodies warm.

This apparatus is a flat vessel, constructed either of wood or metal, perforated on top in order to limit the amount of air

accessible to the burning coals with which it is filled. This limited supply of air produces a slow combustion, agreeable and economical. The victims never called for assistance, or at least their cries were never heard, neither had they defended themselves against the devouring flames, as their hands were spared and not even blistered. This proves conclusively that prior to ignition they must have been either dead or in a state of insensibility. The inflammation and blistering of the skin, said to be found in some cases, would indicate that the combustion had begun before or immediately after death. Their faces and parts of the bodies not carbonized were red and puffy. This redness was attributed to the fire. The combustion in most cases commenced by the trunk and consumed all the tissues where the accumulation of fat was the greatest, and, as I stated before, the extremities were unburnt.

The combustion was very rapid, the body burned with a bluish, flickering flame that could not be extinguished by the first sprinkling of water; on the contrary, strange as it may seem, it would increase it.

If life existed at the time of ignition, this combustion had always a fatal termination.

The carbonized flesh was very porous and light and retained its original shape, crumbling under the slightest touch. Under and surrounding the body was found melted human fat, which is said to burn very readily if ignited.

Criminals have often tried to destroy the bodies of their victims by fire, but seldom succeed, on account of the length of time required and not having at hand the amount of combustible matter to effect their aim.

It is positively known that, under ordinary circumstances, the human body is not combustible, and will not continue to burn on its own account, even if the veins be injected with alcohol and the body steeped for a long time in this fluid.

If one tries to set said body on fire, the alcohol on the surface will burn with a bluish or yellowish flame until the alcohol only is consumed, and the tissues will remain.

It is furthermore stated that in some post-mortem examinations, performed immediately after death, upon drunkards, who had drunk shortly before death from sixteen to thirty-two

ounces of whiskey, brandy, or gin, that in their blood, and even in the brain, alcohol was found in sufficient quantity to be inflammable.

Although I was fully convinced that alcohol had little or nothing to do with this so-called spontaneous combustion, as an act of conscience I continued my experiments upon living animals.

I administered three times a day to twelve young roosters, through a soft catheter, from half to one drachm or more of brandy. These animals were carefully selected, tagged and numbered from 1 to 12, in order to know how long each one would live, and to keep a record individually as to the length of time of intoxication and the effects produced. The average time that they were fully intoxicated from the doses administered was from four to sixteen hours per day.

At the expiration of fourteen months, through careful management, two roosters remained—the rest had died at different periods during the experiment. A post-mortem examination made on the ten that had died was negative as to the existence of alcohol. Not satisfied, and fearing that I would soon lose the last two, I obtained six more and continued the same experiment, but at the end of two more months the two left of the first twelve had died, and no alcohol was found.

By this time four of the last six had also perished, and still I continued with the two remaining, being very careful to prolong their lives. One morning immediately after I had administered them their doses, one was killed accidentally by my horse. I felt greatly disappointed, and not being then at leisure I kept him until evening, when, to my astonishment, I found alcohol in the tissues of the stomach, by smell, taste and inflammability.

How was this possible that alcohol was found in an animal who had only taken it about four months, when in the stomach and tissues of those to whom it had been administered for over fifteen months not even traces could be found?

I was puzzled for several days, but soon came to the conclusion that it could not have been otherwise, since human as well as animal bodies have the power, *while life exists*, to convert alcohol into carbonic acid and water, the only form

under which alcohol can exist in the *living tissues*. The reason why I had found alcohol in my dead rooster was simply that *life had ceased* whilst there was alcohol in the stomach, which had soaked the tissues and remained there more or less diluted. This fully explains why alcohol has been found in post-mortem examinations performed upon drunkards who had taken a large quantity shortly before death.

I also made this and many other experiments upon pigs, rats, rabbits, dogs, etc., too numerous to relate here, but which confirm the statements just made.

From the above observations and experiments, having found the alcohol theory absurd, I asked myself the following questions:

What could have produced in all victims the redness and puffiness of the face, the sluggish and drowsy feeling which simulates so well alcoholism? What made them complain of cold and seek hot furnaces and foot-warmers? What was the cause of the bronchial irritation? Why did said combustion attack oftener the poorer classes, especially corpulent females advanced in years (although males are not excluded), inhabiting badly ventilated rooms? Why should this phenomenon happen at night, and in winter in the majority of cases? How was it that there were no eye witnesses to the ignition? Why had they not called for assistance, or even tried to or defend themselves against the devouring element? Why should water increase the flames instead of extinguishing them? How could the tissues lose so much water and leave the carbonized flesh so porous? How was it that the light produced by the flames never attracted the attention of any one? As a matter of fact, it was the smoke and the characteristic smell of burnt flesh that led to the discovery. Why was it that the surrounding objects were spared whilst the body was mostly carbonized? What caused the peculiar *blue, flickering flame*? Why was this phenomenon rare in former times, and comparatively unknown in our days? Why this combustion began by the trunk and consumed the tissues where the accumulation of fat was the greatest? Why did all cases prove fatal?

It is to be noted that in the poorly ventilated rooms of the victims improper heating apparatuses were used in which *char-*

coal was slowly burned as a matter of economy, and that this dangerous slow combustion was kept up, more or less, during the whole winter and even in summer, as these poor creatures always felt cold.

Remembering that oxide of carbon is a gas that enters the blood, combining with the hæmoglobin, expelling the oxygen, I was struck with the idea that the dangerous product of this slow combustion was totally responsible for all the symptoms that had been erroneously attributed to alcohol, and that the accumulation of carbonic oxide gas was the prime factor in the so-called spontaneous combustion.

This gas is transparent, colorless, tasteless and odorless; its specific gravity is nearly that of air, in which it readily burns with a blue, flickering, or lambient non-luminous flame. The principal effects of this gas upon the organism, when one is slightly under its influence, are at first headache, dizziness, nausea or even vomiting, but very soon the system gets used to its action and the first symptoms are replaced by prostration, chilly sensations, bronchial irritation, redness of the face and skin, an irresistible desire to sleep, and if its effects are prolonged insensibility will take place, relaxation of the sphincters, and if left in an atmosphere containing a sufficient quantity of oxide of carbon, death will supervene without the slightest struggle. Sometimes after coma has taken place, due to the carbonic oxide poisoning, different forms of paralysis have been noted which are attributed to exposure to cold, but I think that it is due to a lack of nutrition or to compression.

If the volume of carbonic oxide gas breathed is slight and gradually accumulated in the human system, it is compatible with life for many years.

In a glass case having the capacity of 11,875 cubic inches I placed from three to six rabbits at one time and made them breathe an atmosphere to which was gradually added pure monoxide of carbon. They were kept there until they became more or less insensible, and as insensibility took place they were withdrawn and left to recover in the open air. The average time required for anæsthesia to begin was between eight and twenty minutes. This experiment was repeated from four to six times a day, noticing the effect produced on each

rabbit, meanwhile leaving the animal to partake of as much food as he wanted. Their appetite was seldom impaired. I experimented with rabbits for several years, losing some now and then, which were immediately replaced.

The shortest time in which I succeeded in accumulating in a rabbit's tissues a sufficient quantity of oxide of carbon so that the increased combustibility of its tissues would take place was 169 days of continued and careful administration. The skin and subcutaneous, as well as the muscular tissues, were readily combustible, burning with a bluish flame, leaving very porous carbonized masses retaining the shape of the parts that had been consumed, but producing very little smoke, due to the absence of fat.

In all forms of muscular tissues hæmoglobin exists in a diffused form and it serves as a *storehouse for the carbonic oxide*; besides, it accumulates in the subcutaneous and cellular tissues. I made the same experiments on omnivorous animals in whose tissues fat was easily and quickly accumulated. I found that roosters were most susceptible at first to the oxide of carbon, requiring, under the same circumstances as the rabbit, from six to fourteen minutes before insensibility commenced. This is due to the fact that these animals take deeper inspirations than the rabbits, but they soon got used to its effect. This experiment with carbonic oxide was continued for years, identically as before, feeding them (the roosters) with all the substances which were digestible and would tend to increase fat in their tissues, besides stuffing them by the mouth with mashed pecans.

After losing a great many, I succeeded in causing some to accumulate (whilst the fatty tissues were increasing) enough of carbonic oxide to render their tissues combustible, producing all the phenomena of this strange combustion. The rooster whose flesh was combustible had been subjected to the experiment for over eight months.

The so-called spontaneous combustion in man is the *possible result* of gradual, progressive and constant accumulation of oxide of carbon for years. And when I say *possible*, it is because death may take place before the accumulation is sufficient, or the body may not find itself in contact with a flame or

fire—a circumstance which I practically know to be indispensable.

This is what happens. The oxide of carbon begins to burn, producing an intense heat, which immediately carbonizes a small patch of skin, subcutaneous and muscular tissues. The carbonized tissue is very light and porous, absorbing the first drop of melted fat, which readily burns with a characteristic smoke. From this moment, and as long as there is fat to be melted by the intense heat produced by the burning gas, the body continues to burn of its own accord.

The combustion will spread rapidly and continue until the fats and the tissues containing the carbonic oxide are consumed. The carbonized flesh acts as a *wick*, melted fat as combustible matter, oxide of carbon as inflammable gas.

Furthermore, carbonized flesh will absorb water from the tissues that have not yet been destroyed, and at a moderate heat will lose it by evaporation; but if an intense heat is produced the carbonized flesh becomes incandescent, and at this high temperature decomposes water, and forms inflammable and combustible gases, such as oxide of carbon, hydrogen, etc., which, on burning, again produce intense heat.

This fact explains why the first sprinkling of water over incandescent coal will produce a flame instead of extinguishing the fire.

It is of common occurrence that in burning buildings, when the woodwork has been partly carbonized and is still incandescent, the first jets of water thrown upon the structure, instead of extinguishing the fire, will increase the flames.

The cadaveric rigidity began early, but was of short duration. The capillaries were filled with a bright blood, giving to the skin all over the body a special bright red coloration which persisted as long as the body lasted. The muscles were limber and soft. The heart contained in the right ventricle, in the majority of cases, a small coagulum of bright red blood. The lungs were of the same color; the bronchial tubes were more or less congested, containing a few mucosities. The arteries were empty, the veins full of fluid blood, having a brighter color than usually found. The spleen, kidneys and all the abdominal organs were highly congested. The brain was injected and notably softened.

The animals, deprived of their viscera, were kept in open air, in my experimenting room, to ascertain how long it would take before decomposition would set in. As the days passed, the flesh became drier and harder, retaining the red coloration and its semi-transparent appearance, which persisted for years.

I have yet in my possession parts of animals that died several years ago.

The reason why the combustion of the abdominal tissues and viscera are more perfect is not solely due to the accumulation of fat, but to a larger deposit of carbonic oxide.

When carbonic oxide is taken up by the hæmoglobin it always produces congestion and accumulation of blood in the abdominal vessels, and if this is prolonged for a long period the accumulation of carbonic oxide in the abdominal viscera, as well as in all the surrounding tissues, is correspondingly greater.

The gradual accumulation of carbonic oxide in the tissues takes place, expelling the oxygen; therefore oxidation is slower, favoring the formation of fats as well as explaining the reason why the victim complained of feeling cold in all seasons.

I stated before that alcohol had nothing or very little to do with the said phenomenon, but we must not forget that its abuse may also favor the accumulation of fat.

In former times the effects of charcoal fumes were solely attributed to the asphyxiating power of carbonic acid, a gas which is not combustible and extinguishes fire.

Oxide of carbon could not have been even suspected in those days, for it was discovered by Priestly in 1799. Its poisonous effect became known in 1802, and at present is so popularly known that out of over three thousand persons that I have questioned who use furnaces for cooking, ironing, etc., 98 per cent knew the deleterious effects produced by charcoal when it first begins to burn, as well as the great danger of its slow combustion.

If an animal is placed in an atmosphere charged with oxide of carbon, death will take place with convulsions in a few seconds, simply due to the exclusion of oxygen.

I cite from Fodéré's "Treatise on Legal Medicine," Paris, 1813, the following:

In a letter dated 1644, René Moreau, a physican of Paris, spoke of a flame which issued from the stomach of a dead woman at Lyon, France, and says that this flame was what is properly called "*ignis lambens*," of which Virgil has spoken in his poem about Iule, Eneid, Vol. II, as early as 682. The same author, speaking of human combustion, says: "The crytical, analytical, comparative and judicious observation of facts concerning the animal economy, united with the equally judicious application of the discoveries which are constantly being made in natural sciences to explain these same facts, can not fail to enlarge our sphere of knowledge and to make our descendants familiar with phenomena, of which the bare recital seems, at the present time, astonishing and incredible. The beginning of the eighteenth century witnessed, in scientific matters, a spirit of doubt, or, rather an excess of incredulity; we now believe more than our fathers, because the depth of our researches, directed in new channels, has brought to light many new things; many other things are no longer regarded as impossible, which may soon be proved to be facts, provided that the counter force of certain moral institutions does not cause the human mind to retrograde. We saw, in the course of the eighteenth century, an unfortunate citizen, residing in Reims, France, condemned to the scaffold, accused of having murdered his wife and then burned her body in order to escape punishment. Mr. Vigne has cast flowers to the memory of the unfortunate Millet, whose wife, addicted to drunkenness, was found in her kitchen, almost totally consumed, on the 20th day of February, 1725, at a distance of eighteen inches from the hearth. Millet, accused of her death and condemned to die, escaped the fate which he never deserved only at the expense of his fortune, and thus retained the esteem of mankind. Such a case should never again happen, because criminal justice, illuminated by the torch of medical science, will not ignore the possibility of *human spontaneous* combustion, produced either by the abuses of spirituous liquors or due to other causes."

How many dead bodies have been found in which the contact with a burning object was only missing in order to

produce this possible and, up to the present, mysterious phenomenon? If a body is found partly charred, the legal medical question may arise, "Was the body burned to conceal the crime, or was it a case of increased combustibility?" With the lights now before us, it is evident that this question is worthy of serious consideration at the hands of the medical jurist.

The article of Dr. Adrian Hava in this number of the JOURNAL revives a subject that has always been one of interest. In former times, when chemistry was not pursued as it now is, and imagination and faith were more potent than in these days of hard facts, the subject of the so-called spontaneous combustion of the human body received a large amount of attention from grave writers. Novelists also seized upon it as a means of stirring up the souls of the credulous; indeed, as Woodman and Tidy aptly say: "There is no subject in the whole range of medical jurisprudence on which so much romance has been built as upon this. Nearly all popular novelists and great writers have embellished their works by the introduction of some story of this kind, or amused themselves by telling or retelling some of the current legends on this subject. The disappearance of the rag and bottle dealer in Dickens' 'Bleak House' is perhaps one of the best of these. Dickens, however, did more than merely use the incident. He thoroughly believed in the possibility of the occurrence."

That the charm which this subject has for novelists has not yet died out is shown by its introduction by M. Emile Zola, the great French apostle of naturalism in literature, into one of his latest novels, "Doctor Pascal."

In the *Dictionnaire de Médecine*, 1834, Vol. VIII, Breschet quotes from Dupuytren, who seems to have given the subject close and earnest attention. Dupuytren speaks of an old woman who had been addicted for many years to wine and other alcoholic liquors. This woman, after arriving at home, placed herself as usual over a *chaufferette* (or foot-warmer), was asphyxiated by the vapor from the charcoal, and fell in such a position that one leg rested on the *chaufferette*. The skin was burned at several points and entirely destroyed at others. The subcutaneous fat, which was very abundant, melted and fed the flames, which gradually extended to all the parts. The

clothing of this woman, and the bed curtains, were attacked by the flame, and consumed. The floor was covered with a yellowish, fetid, greasy layer several lines in thickness and mixed with the *débris* of the body. Dupuytren thought that in this case the fire first attacked the clothing and then burned the body, the organs of which—and chiefly the adipose tissue—were saturated with alcohol, and consequently in a condition favorable to combustion.

With the improvements in architecture, ventilation and heating, the occurrence of combustion of the human body became more and more infrequent. Nowadays, most people dismiss it with a sneer. In a work on medical jurisprudence not more than a month old, Witthaus and Becker say: "Spontaneous combustion of the human body has been seriously discussed in this connection, and explanations of popularly reported cases have been attempted. The writer refers to the subject here for the sole purpose of stating that no trustworthy evidence of the possibility of any such condition or result exists."

This phenomenon will henceforth be counted among the sober facts of science, and no longer be allowed to be thought worthy of a place only in works of fiction; and we are proud to know that the discovery is due to one of our New Orleans physicians.

Dr. Adrian Hava's attention was drawn to this subject about fourteen years ago, and he has, with various interruptions, pursued his investigations during all that time. The difficulties that beset his path were numerous, but he kept on, and now success has crowned his efforts. He has shown, by experimenting on lower animals, that animal tissues can be so prepared that they can ignite and burn like a piece of wood or other combustible material. These experiments are not devoid of danger; on one occasion an explosion almost destroyed his sight, and he frequently inhaled some of the poisonous gas himself.

The term "spontaneous combustion" is a misnomer. The phenomenon can not be produced without contact with a pre-existing fire; the body does not burst into flames, by itself, but when a suitable body becomes ignited, it continues to burn

until all of the more combustible tissues are consumed. "Spontaneous combustion" must give way to "increased combustibility," and skepticism and sneers must cease in the face of experimental evidence.

The JOURNAL has published abstracts of reports of this strange phenomenon. The last one that came under our notice was one that appeared in the *Manchester Medical Chronicle*, April, 1891. The case occurred in the neighborhood of Manchester, on February 9, 1891, and was observed carefully by a sober-minded British coroner, Dr. Ernest M. Reynolds. In a critical report of this case, Dr. Reynolds does not for a moment question the reality of the phenomenon; the circumstances were such as to make any other explanation impossible; but he was unable to divine the cause that brought about the increased combustibility. He says: "Can there be any truth in the old theory that in certain persons chronic alcoholism leads to a deposit of something in the tissues, which renders them highly inflammable? The rarity—in fact, almost the non-existence—of increased inflammability in any but old alcoholics leads one to think that there must be some truth in this view, but what the inflammable substance is, or where it is deposited, is a complete mystery."

This remarkable phenomenon, known and marveled at for centuries, is now no mystery at all. Dr. Hava has cleared away the mists in which the subject has been enshrouded, and has removed it from the domain of fiction and transferred it to the great and ever-growing mass of demonstrable scientific facts.